

MOBILE FINGERPRINT SCANNER AND DOCKING STATION

Cross-Reference To A Related Application

5 Applicants hereby claim priority based on
Provisional Application No. 60/153,182 filed on
September 10, 1999 and entitled "Mobile Fingerprint
Scanner And Docking Station" which is incorporated
hereby by reference.

Background of the Invention

10 Inkless fingerprint scanners, also known as live
scan fingerprint readers or biometric devices, have been
15 widely used for many years. These systems obtain an
image of the fingerprint without the use of inks. Once
an image is acquired, it is then processed and an
identification or verification of the individual's
identity is made.

20 Many different techniques have been used to obtain
an image of the finger including optical scanners,
thermal scanners, capacitive scanners, E-field sensors,
ultrasonic scanners, and many more. Each uses a
different modality or technique to image the same
25 physical characteristic; the ridge structure of the
finger.

In use of such scanners in law enforcement and
other applications it would be highly desirable to
provide a mobile or portable scanner which can be hand
30 carried easily for convenient use at various physical
locations. It would also be highly desirable to provide
the capability of interfacing with such a scanner at one
or more physical locations for such operations as
downloading fingerprint images and other information

stored in the scanner, scanner battery charging and scanner diagnosis.

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Summary of the Invention

10 The present invention provides a system including a mobile or portable fingerprint scanner and one or more docking stations adapted to operatively receive the scanner. The scanner can be hand carried to various locations for obtaining fingerprint images and other information such as images from bar code scanning. The scanner is battery operated and has the capacity of storing a number of such images. The docking station is 15 in the form of a receptacle into which the scanner is inserted after obtaining one or more images. While the scanner is operatively received in the docking station, the image(s) stored in the scanner are download via a connection to a personal computer or the like, the scanner battery is recharged and the docking station 20 performs various diagnostic operations on the scanner before it is withdrawn from the docking station for further use. In a typical law enforcement situation, the docking station is located within the law enforcement vehicle and the scanner can be used by law 25 enforcement personnel at locations remote from the vehicle. In a typical security situation, a single scanner is carried by the security officer and a docking station is located at each checkpoint or location where the officer is to perform an inspection. Each bay 30 station has a unique identification and there is bi-directional exchange of information between the scanner and the bay station so that the identity of the security

officer can be confirmed and a record of the inspections is made which can be monitored at any time.

The foregoing and additional advantages and characterizing features of the present invention will become clearly apparent upon a reading of the ensuing detailed description together with the included drawing. The following detailed description of the invention, when read in conjunction with the accompanying drawings, is in such full, clear, concise and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention.

Brief Description Of The Drawing Figures

Fig. 1 is a diagrammatic view of the mobile fingerprint scanner and docking station according to the present invention;

Fig. 2 is a schematic diagram further illustrating the mobile fingerprint scanner and docking station according to the present invention; and

Fig. 3 is a schematic diagram illustrating application of the mobile fingerprint scanner and docking station of the present invention in a security system.

Detailed Description Of The Illustrated Embodiments

Referring first to Figs. 1 and 2 there is shown and described a system 10 according to the present invention including a mobile or portable fingerprint scanner 12 and a docking station 14 adapted to operatively receive the scanner. The scanner 12 can be hand carried to various locations for obtaining fingerprint images and

other information such as images from bar code scanning. The scanner 12 is battery operated and has the capability of storing a number of such images. The scanner 12 can be of various types including, but not limited to, ultrasonic, optical, capacitance, E-field and thermal/infrared. By way of example, the mobile scanner 12 can be an ultrasonic scanner of the type shown in United States Patent No. 5,647,364 issued July 15, 1997, the disclosure of which is hereby incorporated by reference. Referring to Fig. 10 of that patent, memory 252 would have the capability of storing several fingerprint images and bar codes which will be described. In addition, the scanner of that patent would be adapted for battery operation. In a typical law enforcement situation, the scanner is carried by the law enforcement officer, such as in a pouch on his belt, to wherever the subject(s) to be fingerprinted is located. The officer can set the scanner on a suitable supporting surface, such as the hood of an automobile, and then use the scanner to take as many fingerprint images as needed. The subject's finger is placed on the image area 16 and the fingerprint is scanned to develop an image thereof as explained in the above-referenced Patent No. 5,647,364. The images are stored in the scanner 12 for later retrieval. A magnetic base 18 on the scanner facilitates temporary securement of the scanner on the vehicle body during use. The scanner 12 can be provided with bar code scanning capability via a bar code scanner 20 on the end of housing 22 so that when the officer takes a fingerprint image of a subject he also can scan the bar code information on the subject's vehicle registration and/or vehicle operator's license. LED indicators 24, 26 and 28 are provided to signal various scanner conditions as will be described.

An on-off switch 30 controls supply of power to the scanner and hence its operation. Scanner 12 is provided with battery recharging posts 32, 34 on one end of housing 22 which mate with contacts at docking station 14 for recharging the scanner battery in a manner which will be described. Scanner 12 also is provided with an infrared data link 36 for wireless transmission of fingerprint images while stored in docking station 14 as will be described.

10 The docking station 14 is in the form of a receptacle into which the scanner is inserted after obtaining one or more images. As shown in Fig. 1, the docking station is generally hollow rectangular in shape, open at one end, and having an interior region 40
15 shaped and sized to receive the scanner in a snug but removable manner. While the scanner is operatively received in the docking station 14, the image(s) stored in the scanner are downloaded via a connection to a personal computer or the like, the scanner battery is
20 recharged and the docking station performs various diagnostic operations on the scanner before it is withdrawn from the docking station for further use. In a typical law enforcement situation, the docking station 14 is located within the law enforcement vehicle, being
25 mounted to the floor or inside wall of the vehicle, such as by the brackets 42, 44 or the like and the scanner 12 can be used by law enforcement personnel at locations remote from the vehicle as previously described. When the law enforcement officer returns to the vehicle, he
30 inserts the scanner 12 in the docking station 14. The scanner 12 is retained within the docking station by a magnetic latch or other suitable means (not shown). The docking station 14 is connected to a source of 12 volts d.c. in the vehicle, such as to the vehicle battery by

appropriate connection or through the cigarette lighter receptacle. The docking station 14 also is connected to the personal computer commonly provided in law enforcement vehicles, via the USB connection 46

5 indicated in Fig. 1. Docking station 14 also is provided with LED status indicators 50, 52 and 54. While the scanner 12 is in the docking station 14, the images stored therein are downloaded to the onboard PC for processing. The scanner battery is recharged while
10 in the docking station 14. The two battery charging posts 32, 34 shown in Fig. 1 on one end of the scanner 12 mate with corresponding contacts in the docking station 14 to connect the 12V vehicle supply to the scanner battery. Also, each time the scanner 12 is
15 stored in the docking station 14, a diagnostic routine is run on the scanner. If a problem is detected, the next time the scanner 12 is removed from the docking station 14 the scanner automatically is disabled and the appropriate LED status indicator is operated.

20 Table 1 sets forth additional features of scanner 12 and docking station 14, and Table 2 sets forth various advantages of the same.

25 Table 1

Scanner

- Image Size - 0.75"w x 1.0"l
- Stores up to 8 complete fingerprint images
- LED Indicators:
30 Green - scanner ready to acquire image
Amber - flashes the number of fingerprint images stored internally
Red - low battery indicator
- Resolution - 500 dpi, 256 levels of grey

- Infrared wireless communication link downloads images to docking station
- Standard 9 volt rechargeable battery provides several hours of operation
- 5 • Size: 5.75"l x 3.25"w x 2.0"h
- Weight 2.1 lbs

Docking Station

- 12 volt DC operation
- 10 • Interfaces to Mobile Data Terminal via USB port
- LED indicators
 - Green - power on
 - Amber - transferring data to MDT
 - 15 Red - scanner batter recharging
- Built-in 9 volt battery charger
- Floor or side wall mount options
- Complete Software device drivers provided as a DLL for Win 95/98 and NT
- 20 • Size: 9"l x 3.8"w x 2.6"d
- Weight 1.7 lbs

General

- UL 1950, CSA No. 950-22.2, and FCC approvals
- 25 • Reliability - vibration tested to 9.5Gs, 20-2000Hz, random sinusoidal
- Operating Temperature - 140°F (max)
- Storage Temperature - 158°F (max)

30 Table 2

- Proprietary ultrasonic technology unaffected by most contamination found on fingers or platen

- Stores up to 8 individual fingerprints for transferring to Mobile Data Terminal
- Operation unaffected by ambient light or glare
- Self-test scanner diagnostics automatically
5 activated upon removal from the docking station
- Images automatically deleted upon successful transfer to docking station
- Magnetic base easily attached to vehicle
- 10 • Durable scratch resistant platen
- Rugged construction designed to withstand the harshest of environments
- Stores in pouch for easy mounting on the law enforcement officer's belt
- 15 • Securely locks into docking station
- Vehicle docking station installs easily using floor or side mount bracket

The foregoing is illustrated further in Fig. 2.

20 The bidirectional arrow 40 represents the path along which scanner 12 is inserted into and withdrawn from interior region 40 of docking station 14. Contacts 62 and 64 within scanner 14 are connected to a battery 66 or other appropriate voltage source for recharging the

25 battery within scanner 12 when scanner contacts 32, 34 mate with docking station contacts 62 and 64. A personal computer 70, i.e., the onboard PC previously mentioned, is connected via cable 72 to the USB connection 46 on docking station 14 for downloading the

30 fingerprint images stored in scanner 12 for processing by computer 70. Another connection via cable 76 between computer 70 and station 14 is shown in Fig. 2 for the purpose of performing the diagnostic routines on scanner 12 as previously described. The LED indicators 50, 52

and 54 are connected by lines 80, 82 and 84 respectively to an appropriate routing/processing circuit 86 which, in turn, is connected by cable 88 to computer 70 for control of the indicators. Obviously, the three cables
5 72, 76 and 88 shown in Fig. 2 can be combined into a single cable connection between PC 70 and station 14.

Fig. 3 illustrates application of the mobile or portable fingerprint scanner and docking station of the present invention in a security system. In a typical
10 security situation, a single scanner 12' is carried by the security officer and a docking station is located at each checkpoint or location where the officer is to perform an inspection.

In Fig. 3 the three locations identified #1, #2 and
15 #3 represent checkpoints or location where the security guard is scheduled to inspect or contact during his inspection round. While three locations are shown in Fig. 3 by way of illustration, there can be any number of such locations. A docking station of the type shown
20 in Fig. 1 is located at each location #1, #2 and #3 in Fig. 3. They are designated 14', 14" and 14" in Fig. 3. However, each docking station is a stand alone unit, not connected to a PC ,and has its own power supply. A microprocessor is provided in each docking station and
25 each station has its own unique identification number or code. The microprocessors are designated 100, 102 and 104 in Fig. 3. Each scanner is provided with a time of day clock, for example clock 110 in scanner 12', and bi-directional communication represented by arrows 112 in
30 Fig. 3 is provided between each scanner and the docking station when the scanner is placed in the station.

When the security officer makes his round, when he reaches each of the locations #1, #2 and #3 shown in Fig. 3, he operates the scanner carried with him to scan

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his fingerprint then inserts the scanner into the docking station at that location. The bi-directional communication between scanner and docking station provides a record of the time of day, the unique i.d. of the docking station and the fingerprint image of the security officer. This record can be stored in either or both of the scanner and docking station. Then, when the security officer completes the round, he inserts his scanner into the supervision base or docking station which downloads the fingerprint images along with the times of day correlated with the docking station identification numbers to the PC for further processing such as sending to a central monitoring station. As a result, control is provided on the security officer himself by way of the fingerprint imaging and his round by way of the times of day recorded against the docking station identifications. If desired, the docking stations can be connected together for direct transmission to the PC or other monitor as indicated by the broken lines in Fig. 3.

The principles of the arrangement of Fig. 3 can be applied to other situations, for example in monitoring the rounds of persons who inspect and service ATM machines. In all of the situations, the entire monitoring task can be accomplished using a single scanner in combination with a number of docking stations. Since the docking stations are relatively less expensive to manufacture this can result in economic advantages. In the application illustrated in Figs. 1 and 2, an entire fleet of law enforcement vehicles can be equipped with docking stations at relatively low cost and the fingerprint scanners can be acquired according to operational plans and budget.

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